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ARCHIVES OF PEDIATRICS

A MONTHLY DEVOTED TO THE

DISEASES OF INFANTS AND CHILDREN

JOHN FITCH LANDON, M.D., Editor

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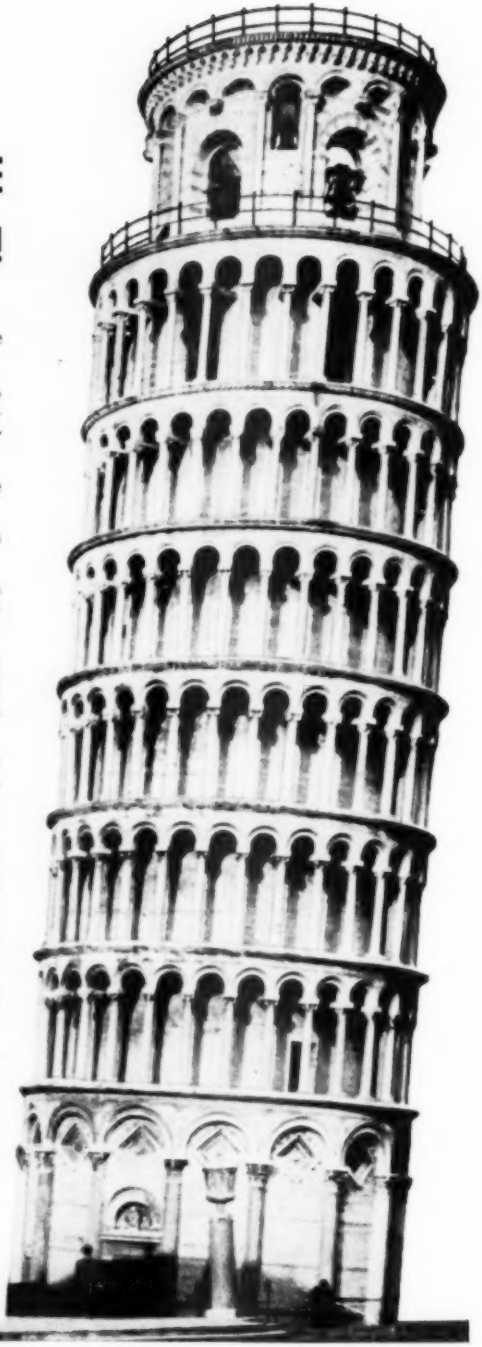

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*Vital Statistics—Special Reports: Vol. 25, No. 12, National Office of Vital Statistics, Washington, D. C. (Oct. 15) 1946, p. 208.

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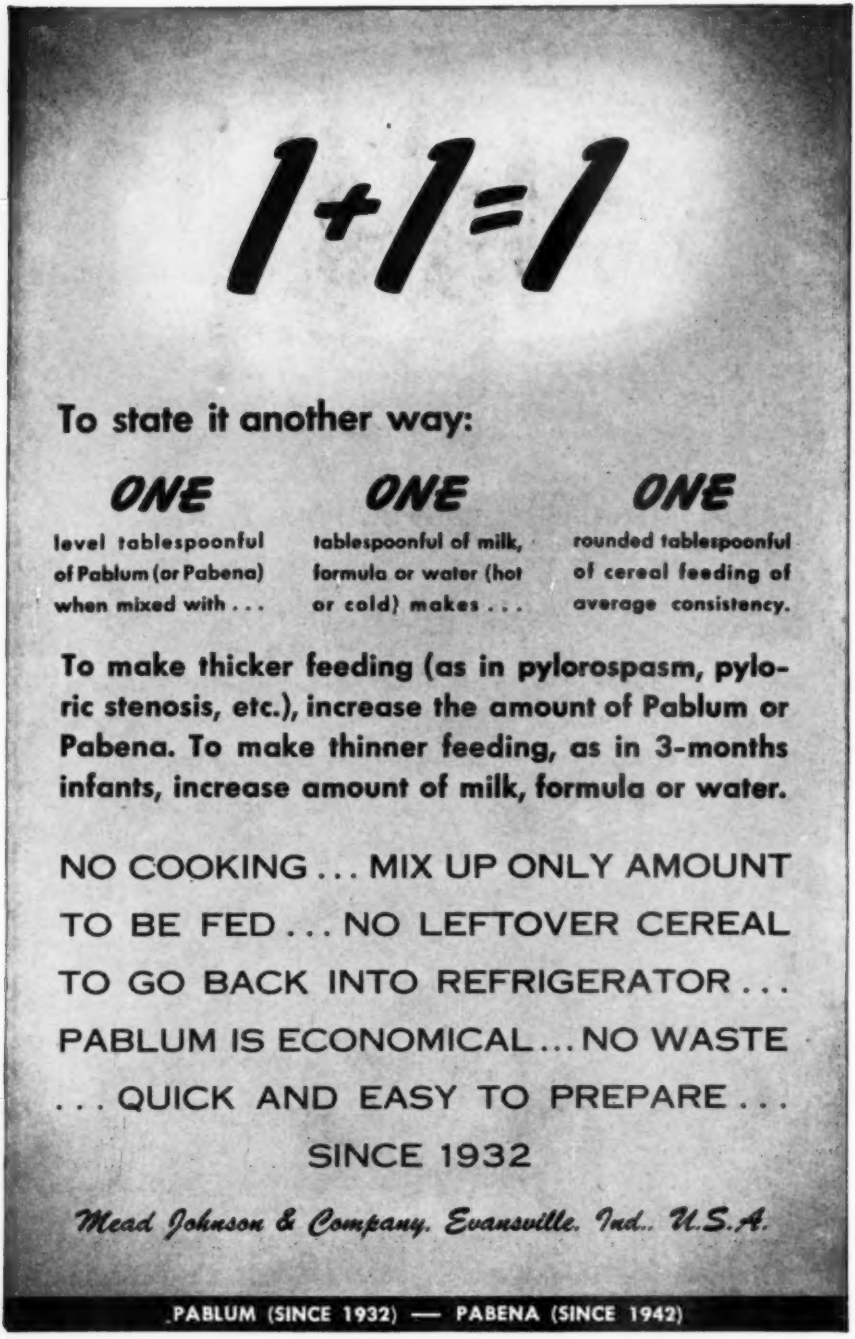
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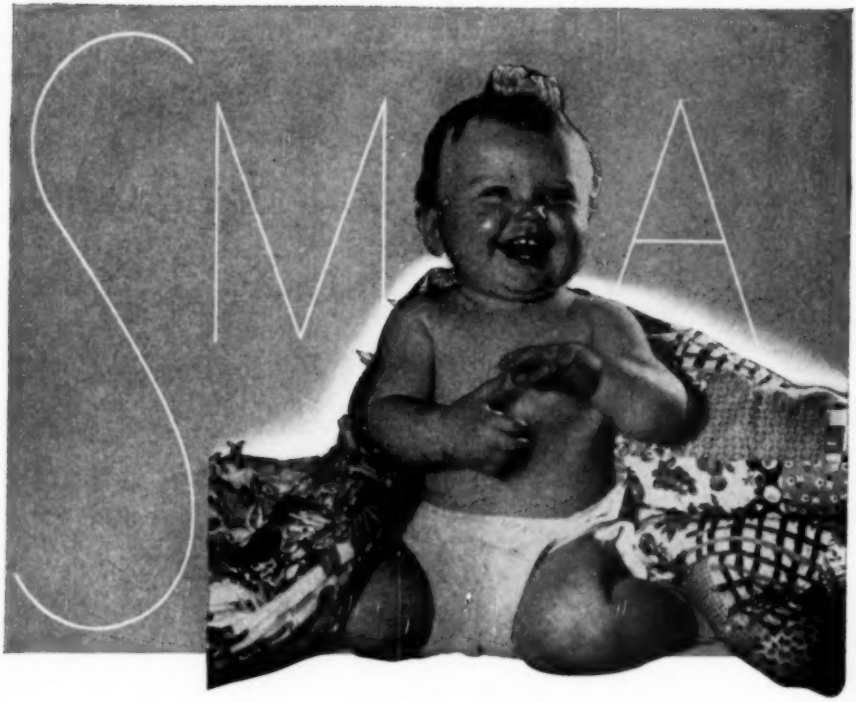

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THE SCHWARTZMAN PHENOMENON WITH PENICILLIN

REPORT OF CASE

MURIEL BOELTER, M.D.
AND
ALEXANDER HATOFF, M.D.

Oakland, Calif.

The adverse symptoms produced by penicillin are well-authenticated clinically as well as by laboratory investigation.[1] According to Morginson[2], these result from the action of penicillin as a direct toxin and a primary irritant, from the action of penicillin as an antigen, from the action as a therapeutic shock excitant, or from the indirect action on pathologic processes. Positive intradermal reactions, Prausnitz-Kustner reactions, and positive Arthus phenomena have been observed with crystalline penicillin.[3,4] In addition to these, we have observed one patient demonstrating a Schwartzman phenomenon with penicillin.

The Schwartzman phenomenon is a severe hemorrhagic reaction with necrosis seen in rabbits which receive into the skin of the abdomen a first injection of 0.25 cc. of typhoid or certain other culture filtrates. Twenty-four hours later they are injected intravenously with 0.01 cc. of the same filtrate. The site of the initial intradermal injection turns blue at the center and red at the periphery. The skin becomes glossy, smooth and edematous. Histologically, the blood vessels below the surface are ruptured, and there are numerous dead leukocytes present.

A similar reaction was observed in a patient receiving penicillin, where the locally sensitizing injection was of penicillin in oil injected into the buttocks, and the "flaring" injection was of regular penicillin subsequently injected intramuscularly at a point distant from the reacting site.

CASE REPORT

K. S., a ten-year-old white female, was admitted to the Permanente Foundation Hospital, Oakland, California, from Vallejo, California, on August 20, 1946, because of persistent positive findings in the x-ray films of the chest. The present illness dated from June 12, 1946 when a routine adenotonsillectomy was performed under general anesthesia without immediate complications and with good recovery. No further symptoms were observed until approximately two months later. On August 6, 1946 the patient developed a severe hacking cough, noted especially at night, and not accompanied by any other symptoms. The diagnosis of aspiration pneumonia was made at the Marysville Clinic on August 12, 1946 and confirmed by x-ray examination on that date. Treatment with penicillin aerosol had cleared the cough completely but had produced no change in the x-ray findings in the chest. There had been a progressive loss of weight of five pounds from June to August 1946. The remainder of the history was noncontributory, except for a positive family history of allergy.

Physical Examination revealed dental caries, dullness to percussion in the right axillary region, and harsh breath sounds in the same area on auscultation.

Laboratory Examinations are tabulated as follows:

(a) X-ray Examinations of the Chest:

August 12, 1946. Density of the right middle lung field of the type seen in virus pneumonia.

August 20, 1946. Rather extensive but not very dense area of consolidation in the medial right lower field.

August 26, 1946. Very slight haziness in right lower field.

September 4, 1946. Further resolution of the area of consolidation of the right lower lung field.

(b) Complete Blood Counts:

Date	8/21/46	8/26/46	8/31/46	9/2/46
Hemoglobin	83%	84%	79%	....
White blood count	7,800	13,500	12,600	7,500
Neutrophils	56	81	73	60
Lymphocytes	40	18	21	32
Monocytes	4	1	5	4
Stabs	2	10	7	6
Eosinophils	0	0	1	4

(c) Sedimentation Rate: 5 mm. per hour on August 21, 1946.

(d) Routine Urinalyses:

Date	8/20/46	8/27/46	8/30/46	9/1/46
pH	5.5	5.5	5.5	7.0
Specific gravity	....	1.020	1.016	1.020
Sugar	0	0	0	0
Albumin	0	Faint trace	Faint trace	0
Squamous epithelia	....	Few	Many	Loaded
White blood cells	1-2	2-5	6-10	0

(e) Kline Test: Negative on August 21, 1946.

(f) Throat Culture: Alpha and beta streptococcus hemolyticus. Staphylococcus aureus hemolyticus.

Therapy. The patient was started on carbogen, deep breathing and supportive measures. On August 21, 1946 she was given 50,000 units of regular penicillin intramuscularly. Only one dose was given. On that same day she was started on 200,000 units of penicillin in oil intramuscularly every twelve hours. The last dose of penicillin in oil was given at nine P. M. on August 29, 1946. Thereafter, beginning at three A. M. of August 30, 1946, she was given 30,000 units of regular penicillin intramuscularly every three hours. Penicillin was discontinued at eight A. M. on August 30, 1946, after only two doses had been given. The course of therapy was then completed with sulfadiazine.

Course. The patient was asymptomatic and afebrile for nine days after entry into the hospital. During the morning of the tenth day (August 30), she was observed to have itching buttocks. This was concomitant with the change from penicillin in oil to regular penicillin. Examination revealed six to eight urticarial wheals ranging in size from a quarter to a half dollar distributed on the buttocks. These were indurated and nontender. *Each of these lesions surrounded a puncture site previously used for the administration of penicillin in oil.* The child complained of severe pain which now accompanied the injection of penicillin. Previously the penicillin injections had been painless. She was

irritable and crying. Slight ptosis of the right eyelid supervened. She had a temperature rise from 100° F. (R) on August 28, to 101.2° F. (R) on August 29, and to 101° F. (R) on August 30, 1946.

Local symptomatic therapy, including sitz baths, were used to treat the lesions of the buttocks. On August 31, confluent erythema was present over the entire buttocks, and one area of induration was palpated. As pruritus diminished the patient became generally more comfortable. The subsequent course was afebrile. By September 2, 1946, the erythema faded and by September 3, 1946 had disappeared completely.

SUMMARY

The case is presented of a ten-year-old white female who demonstrated a Schwartzman type of phenomenon using penicillin as an antigen under an unusual set of circumstances in the management of her therapy. The reactions occurred when regular penicillin was injected intramuscularly elsewhere than in the buttocks. When this was done a severe reaction occurred at the sites on the buttocks where penicillin in oil had been injected intramuscularly at an earlier date.

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2950 Webster Street.

THE ROCKING BED—ITS USE IN POLIOMYELITIS*

MAURICE LENARSKY, M.D.

New York.

The Willard Parker Hospital during the past year acquired a rapid rocking bed for use in the treatment of acute poliomyelitis. This paper is a review of the background of the rocking bed, the principle of rocking as a means of artificial respiration, and the use of the bed in the treatment of respiratory failure in acute anterior poliomyelitis with specific reference to two patients treated on this bed.

The terms oscillating, rocking and undulating, which have been applied to the moving bed, according to the dictionary all mean the same, referring to motion backward and forward, and/or up and down, although they do connote slightly different kinds of motion in their individual usage. The terms are used here for the most part interchangeably.

The introduction of the rocking bed as a means of artificial respiration for patients with respiratory failure in acute anterior poliomyelitis was preceded by two events: (1) the introduction of a rocking bed for the treatment of diseases of the circulation, and (2) the earlier discovery of the value of rocking as a method of artificial respiration.

The Sanders Oscillating Bed for Cardiovascular and Peripheral Vascular Diseases. In 1936, Sanders,[1] of Kansas City, described an electrically driven oscillating bed for the treatment of cardiovascular and peripheral vascular diseases. The mechanical principle is like that of the seesaw—an ordinary hospital bed attached to a cradle on a fulcrum midway, allowing the ends to move alternately up and down. The arc traversed and the speed of the complete cycle can be adjusted, and the bed at any of the speeds moves so slowly that the patient is hardly aware of the movement.

The therapeutic principle which has long been known is simply that of postural exercises to improve peripheral circulation and cardiac efficiency, but the bed permits the change in position to be carried out with a steady continuous rhythm for long periods without effort on the part of the patient.

*From the Poliomyelitis Service, Willard Parker Hospital, New York, New York. Read at the Clinical-Pathological Conference, Willard Parker Hospital, June 21, 1949.

Sanders[1] explained that in peripheral vascular diseases improvement in local circulation by relief of venous stasis and back pressure, and by intravessal aspiration promoting better arterial blood supply, is manifested by improvement of the temperature of the affected part, relief of pain, healing of ulcers and retardation of the progress of gangrene. In congestive heart failure, combined with other medical treatment as indicated, improved return flow of blood to the heart and improvement in cardiac function result in the relief of edema and a general improvement in blood circulation and nutrition and oxygenation of tissues.

Although the rocking bed has been used most frequently in the treatment of peripheral vascular diseases[2, 3, 4] it has been used or suggested for use in other conditions: to prevent such ill effects attributed to prolonged bed rest as hypostatic pneumonia, cerebral edema, venous thrombosis, pulmonary embolism, myasthenia, decubitus ulcers, osteoporosis and urinary tract stone formation[5]; for the treatment of conditions ameliorated by postural drainage, such as bronchiectasis, or improved blood supply as in apical tuberculosis[6]. Finally, it has been adapted, by speeding-up the oscillations, for the administration of artificial respiration for patients with respiratory failure in acute poliomyelitis[7], and this adaptation should prove effective for the resuscitation of patients with respiratory depression or arrest from other causes, such as drug and gas poisoning, drowning and electric shock.

The Sanders oscillating bed is available under the trade name of Vasoscillator.* This bed can be adjusted to three speeds, approximately 1½ to 2 minutes, 3 to 4 minutes, and 6 to 7 minutes for a cycle. A complete cycle is the distance of the head end from horizontal position to high then to low and back to horizontal. The arc traversed can be adjusted too, and it may be as large as approximately 60 degrees. The head and foot of the bed are hinged so that either can be raised, and the patient may lie in the semirecumbent position with the thighs and knees partially flexed. The bed may be used for periods of treatment during the day, or patients may be kept on it for continuous treatment day and night for weeks or months as indicated.

The Eve Method of Artificial Respiration. The Eve method of artificial respiration of the drowned, or apneic patient in shock from other causes, is named after the English physician, and is a

*American Hospital Supply Company, Evanston, Illinois.

tilting or rocking of the patient up and down. Eve discovered this rocking method in 1932[8] when he used a rocking chair to treat a 2-year-old girl desperately ill with acute respiratory failure due to diphtheritic involvement of the diaphragm. He placed the child head down to secure drainage and thus relieve the accumulation of secretions in the pharynx and larynx, but fearing such a position might lead to atelectasis and pneumonia, he conceived the idea of alternating the head up and down, using a rocking chair for this. The rocking was continued for 2½ days until the diaphragm recovered its tone. The child recovered completely.

The method is simple, requiring a board or stretcher laid across a fulcrum situated midway[9]. The patient lies prone on this and two persons, one at either end let the head up and down alternately. The patient may even be rocked lying across the interlocked outstretched arms of two persons. Eve suggested a tilt of no more than 30 degrees each way, about 10 to 12 times a minute as enough to ventilate the lungs. More, he thought, might produce acapnia, i.e., too little CO_2 in the blood. Therapeutic gases may be administered as indicated.

The Eve method is based on the principle of gravity to influence the main respiratory muscle, the diaphragm, and thus by altering thoracic capacity to obtain an effective exchange of tidal air.[9, 10, 11]

Normal respiratory movements consist of an active inspiration and an expiration which is to a large extent passive. Active inspiration is made by the diaphragm alone, or by the diaphragm together with some action of the muscles which elevate the ribs. At the end of inspiration, the ribs and the diaphragm are brought back to the normal positions by purely physcical forces—the elasticity of the abdominal wall, elasticity of the expanded lungs, and the weight and torsion of the ribs. Quiet breathing is chiefly diaphragmatic or abdominal.[12]

When breathing is labored or difficult, forced inspiration is characterized by greater action of the costal muscles. Forced expiration may be produced in two ways: first, by forcing the diaphragm farther up into the thoracic cavity, and this result is obtained not by any direct action of the diaphragm, but by contracting the muscular walls of the abdomen, producing the abdominal press, and second, by depressing the ribs which is brought about by the contraction of the depressor muscles of the ribs.[12]

Without active use of the muscles of respiration, changes in capacity of the chest by manipulation or force can be very slight because of its relatively rigid framework. But the diaphragm can be influenced to some degree, and sufficiently to produce effect, by the weight of the abdominal contents.[9, 11] In the Eve method of artificial respiration, the head-up position allows the diaphragm to descend, thus increasing thoracic capacity; this further reduces the intrathoracic pressure (all intrathoracic pressure is subatmospheric or negative), that is, it increases the negative pressure, the lungs expand and air is forced in. With the head-down position, the diaphragm is pushed up by the weight of the abdominal contents, the thoracic capacity is decreased, the intrathoracic pressure is increased, that is, the negative pressure is reduced and air is forced out.

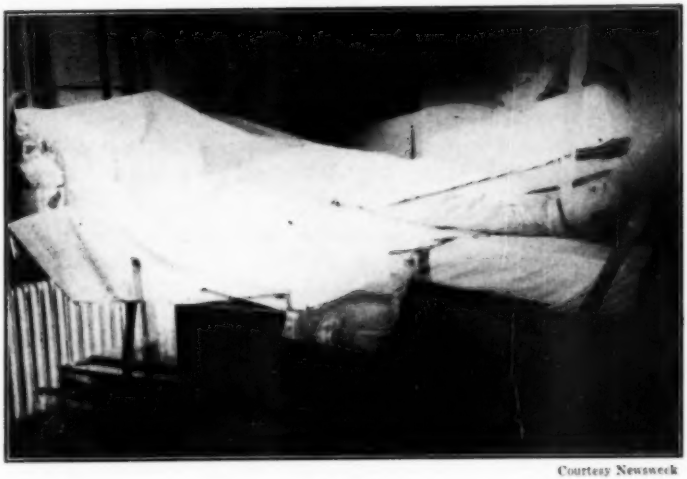
Rocking as a means of artificial respiration also improves the return of venous blood to the heart, stimulates cardiac action and increases the flow of oxygenated blood to the vital organs of the body, and especially to the readily vulnerable nerve cells.[13]

Experiments indicate that the Eve gravity method produces a greater exchange of tidal air[14] and that it seems to be more effective than the Schafer prone pressure method, the most widely used manual technic.[15] Eve's method of resuscitation is favored by the British Navy[9] and it has been used aboard American naval vessels.[9] The rocking method has been tried and recommended for the resuscitation of the asphyxiated newborn.[16]

The Respir-aid Rocking Bed in Respiratory Failure in Acute Anterior Poliomyelitis. Jessie Wright,[4] of Pittsburgh, attempted to wean a patient from the respirator by means of the Sanders bed. Despite the slow oscillations, she thought that it offered some help to the patient. This encouraging experience led to the building of the Respir-aid Rocking bed which provided the rocking at a more rapid rate, and with this bed she was able to administer artificial respiration effectively and to more quickly wean a patient from the respirator. Dr. Wright feels that patients with mild or moderate paralysis of the respiratory muscles, who are admitted to the hospital early in their illness, may not need the respirator and can go immediately on the rocking bed for care. Patients with severe respiratory paralysis, or those who are admitted with the exhaustion of continued respiratory difficulty will need the res-

Courtesy Newsweek

Fig. 1.



Courtesy Newsweek

Fig. 2.

pirator. She emphasizes that the rocking bed makes it possible to limit the time in the respirator and thus to avoid the tendency of the patient to become too dependent on its effect. The patient feels less restricted and he is more accssible for nursing care and physical therapy. In addition, the rocking promotes cardiovascular circulation in the presence of paralyzed musculature and inactivity.

In giving care to the patient on the rocking bed, Dr. Wright states that the nurses, physical therapists and other attendants learn to adapt their treatments to the rhythm of the bed. The patient may be taught to inhale as the head of the bed rises, and exhale as it falls. Speaking is easier when the head is dropping and air is forced out, swallowing when the head is highest. Tolerance for eating while the bed is in motion is gradually built up, starting with small amounts of liquids, then adding solids. It is desirable not to rock the patient after a full meal. Dr. Wright suggests several short periods a day on the bed gradually increased, rather than one long period.[4]

Experience with a Rocking Bed at the Willard Parker Hospital. —The Davidson "undulating bed,"* which we acquired in the late Fall of 1948, is in its rocking feature like the Sanders oscillating bed, and like the Respir-aid rocking bed it is made to rock at a more rapid rate. It may be adjusted easily to move at any rate from 9 to 28 cycles a minute, with a complete arc of 60 degrees, that is 30 degrees down from the horizontal position to 30 degrees up, or with any smaller arc. The two patients to be described did well with a complete arc of about 30 degrees and with a speed of 16 cycles a minute, although in each case the respiratory rate was approximately twice this. This bed has attachments by which oxygen may be administered (Figs. 1 and 2).

The experience at the Willard Parker Hospital concerns two acute anterior poliomyelitis patients with respiratory failure. Both present many interesting features, but complete case reports are not included here, the discussion referring chiefly to their reactions to the undulating bed.

The first patient treated on the bed was a little girl of 5½ years of age who was put into the respirator on the day of

*Davidson Gas Therapy, Inc., Mount Vernon, New York.

admission, October 29, 1948, the fourth day of her illness. There was involvement of the four extremities, the diaphragm and the chest muscles, with difficulty in breathing manifested by poor color, apprehensiveness and the use of her accessory muscles of respiration. On the eighth hospital day, with some recovery of her respiratory strength, but only enough to allow a maximum period of one hour out of the respirator, she was transferred to the undulating bed, and although there were some difficulties in adjusting, it was not necessary at any time to return her to the respirator.

The child did not sleep well the first night—respirator patients have most dependence on the machine for sleeping—she was restless, her pulse rate increased, her color was not good and there was a slight febrile reaction; but she quickly adjusted so that in 24 to 36 hours she was comfortable on the bed, and in 10 days the rocking was discontinued during the night. Rocking was continued during the day intermittently at this time probably more for the physiotherapeutic effect than for the resuscitative influence. In 2 more weeks, thus about 3½ weeks after being placed on the bed, the child was completely comfortable on the bed without any rocking period at all.

During this period of treatment on the undulating bed, the patient was given the required physical therapy, with noticeably more rapid improvement in her general muscle power, not the usual course for patients confined to the limited space of the respirator. This little girl, despite the early severe paralyses, is making good recovery, and she is at present up in a wheel chair.

It appears in this case that the undulating bed effectively provided artificial respiration and permitted removal of the patient from the respirator sooner than one would have expected, considering the extent of her paralyses and her progress in the respirator. The physiotherapeutic effect of the bed's motion may have contributed to the very satisfactory recovery in musculature, although it is difficult to predict in early poliomyelitis the extent of recovery or disability, or to conclude too quickly from methods of treatment.

The second patient treated on the Davidson undulating bed was an 18-year-old girl, admitted to the hospital on September 30, 1948, a severe progressive bulbospinal poliomyelitis with difficulty in swallowing and extreme peripheral paralyses. With

progression of her bulbar symptoms and increasing failure of the muscles of respiration, she developed obstruction to her airway with sudden severe cyanosis. On laryngoscopy there was evident much accumulation of secretions and laryngeal spasm, necessitating immediate tracheotomy with an airway in place. The respiratory paralysis required aid for breathing and she was placed in a respirator. These events all transpired on the day of admission.

The extreme involvement of the chest muscles and the diaphragm did not permit more than a few minutes at a time out of the respirator, and recovery was extremely slow. However, 3½ months later, on January 22, 1949 (at this time she could remain out of the respirator for periods varying from 10 to 30 minutes) she was transferred to the undulating bed. The first trial on the bed permitted only 45 minutes of rocking before it was necessary to return her to the respirator. During the next 3 weeks, treatment on the bed was irregular, and most of the time was spent in the respirator. However, the patient gradually built up a tolerance, and became more reconciled to treatment on the bed, so that in another week she could stay on it for as long as 2 hours. The rocking periods were slowly increased, so that she now remains on the bed during the entire day, but must be returned to the respirator for the night.

This patient has been on daily penicillin therapy since admission to the hospital. Although a severe bulbar poliomyelitis with respiratory paralysis, and treated all these months in the respirator, she has shown no pulmonary complications. She is unusual too, in that she does not swallow even small amounts of fluids or food, and she must be gavage-fed. The tracheotomy tube is still in place, and any attempt to urge her to swallow or to deny her artificial respiration for too long is manifested by signs of great distress and the rapid appearance and accumulation of saliva which must be suctioned from the mouth and the tracheotomy tube.

At present this patient has a great deal of neuromuscular disability, with enough respiratory paralysis to require artificial respiration. However, she can go without any artificial respiration for about one hour. Some of her reactions to treatment and her resistance to change are probably on a psychogenic basis. These factors, combined with the apprehensiveness on the part of those attending her, have somewhat limited experimentation

with the rocking bed and attempts to further wean her from the respirator and the tracheotomy tube.

In this case too, the undulating bed has been effective in providing artificial respiration, permitting more intensive physical therapy and offering hope that the patient may be removed completely from the respirator. It does not seem likely that had she been treated only in the respirator she could spend the entire day outside it as she does now on the rocking bed.

Periods of artificial respiration were also given this patient effectively by means of a portable apparatus.*

Portable respirators have a value aside from their compactness because the patient is not completely encased, thus allowing more movement of the extremities and permitting the treatment on any hospital bed with greater access to the patient for nursing care and physical therapy. But they are more or less cumbersome and may tend to irritate the skin, whereas the patient treated on the moving bed is free of such mechanical restraint.

A second rocking bed has been recently acquired, but it has not yet been tested on a patient. It is a Sanders bed, a Vasoscillator, which was described above, but speeded up to provide artificial respiration. This new bed is made to move at three speeds—8, 16 and 32 complete cycles a minute, with a complete arc as large as 60 degrees although it can be adjusted for any smaller arc.

SUMMARY AND CONCLUSIONS

The rocking bed introduced for the treatment of cardiovascular and peripheral vascular diseases, and its adaptation for use to provide artificial respiration in acute poliomyelitis are discussed.

Two poliomyelitis patients with respiratory failure treated effectively on a rapid rocking bed (Davidson undulating bed) are described.

It appears from this experience that in acute anterior poliomyelitis, the rapid rocking bed does not replace the respirator in the treatment of patients with severe respiratory failure; it is supplementary to, and an aid in, weaning patients from the respirator. The rocking bed can be of primary use, however, in mild or moderately severe cases of respiratory failure, and in cases where the indications for resort to the respirator are not decisive.

*Monaghan Plastic Dome Respirator, J. J. Monaghan Co., Inc., Denver, Col.

Poliomyelitis patients treated on the rocking bed are more accessible for nursing care and more intensive physical therapy.

Acknowledgement. Acknowledgement with thanks is made to the house staff, and especially to Dr. William H. Robison and Dr. Samuel Sepkowitz, resident physicians, and to the nurses and physical therapists, for their interest in the undulating bed, and for their diligence and skill in the care of the patients treated on this bed.

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BLOOD FINDINGS IN JUVENILE AMAUROTIC IDIOCY. (Nordisk Medicin, Stockholm, 38: 1072, May 28, 1948). Blood studies of 6 patients with this disorder revealed abundant vacuole formation in the lymphocytes in cytoplasm otherwise apparently normal. Vacuolated lymphocytes, van Bagh and Hortling state, were fewer in recent cases than in those of longer standing. In the sternal punctate, without other pathologic cell elements, the vacuolated lymphocytes were less numerous than in the peripheral blood. Attempts to stain the vacuoles by different staining methods failed. The vacuoles did not appear in dark ground illumination. The occurrence of highly vacuolated lymphocytes is believed to be significant in the establishment of juvenile amaurotic idiocy. The vacuolation is assumed to be due to a disturbance in the vital function of the mature lymphocytes, possibly dependent on disturbance in lipid metabolism.—*Journal A.M.A.*

PHYSIOLOGIC BOW LEGS*

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Physiologic bow legs is a growth variant. Although it is a common condition, it has received very little recognition from pediatrician and orthopedic surgeon.

Normally the new born infant has a considerable degree of lateral bowing of the lower extremities with a flexion deformity of the hips. Usually, at about one year, the bowing of the femora disappears so that characteristically about the time the child begins to walk there is bowing above the ankle and just below the knee while above the knee there is a compensatory valgus deformity. This results in an almost straight extremity. During the second year the bowing disappears from below the knee and the child has decided knock-knees which persists until four to six years of age. The bow legs may carry over until the child is two or three years of age and then subsequently develop into knock-knees. Rickets has nothing to do with the process. It is not safe to undertake radical correction of this type of bow legs until the child is four or six years old and one is sure spontaneous correction will not occur.[1]

During the period from October 1938 through January 1946, fifty-one children were brought to the crippled children's clinic at Gallinger Municipal Hospital, Washington, D. C., with the primary complaint of bowed legs. Of the total group of 51 children, 31 returned for a sufficient number of clinic visits to allow a conclusion to be reached regarding the outcome of treatment of their deformity. The records of this group of 13 white and 18 Negro children were reviewed in an effort to determine how many were suffering from clinical rickets and what was the ultimate appearance of their extremities when last seen by the clinic staff. The ages of these children when first seen ranged from three months to five years. In 13 of the 31 cases the examiners felt that mild rickets was possibly present. Ten of this group of 13 were Negro children. This impression of possible rickets was based in most instances on a history of irregular intake of cod liver oil or other vitamin D preparation. In three of the 13 cases, however, the radiologist reported possible healed rickets from radiograms of the wrists. In only one

*Released for Publication by the Bureau of Maternal and Child Welfare of the Health Department of the District of Columbia.

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instance of the total group of 31 did the examiners feel that definite rickets were present. This was a five-year-old colored boy with fairly marked bow legs who had never received cod liver oil. The remaining 17 cases showed no clinical evidence of rickets. The final score was 13 thought to have possible mild rickets, one diagnosed as having definite rickets and 17 considered as having no clinical evidence of rickets.

Treatment in all cases consisted of first an attempt to insure adequate vitamin D intake. Cod liver oil was furnished free in an effort to further bolster consumption. Osteotomies were done on three cases, including the five-year-old rachitic Negro boy. One case was treated with distractor casts and a turnbuckle. The four cases treated radically all healed with straight lower extremities and were discharged as cured. The remaining 27 cases received no treatment except dietary supplementation as described, and in a few instances mild corrective manipulation was demonstrated to the mother to be used at home. This manipulation consisted of intermittent pressure applied to the lateral side of the extended knee with one hand while the ankle was held with the opposite hand. The remarkable thing about the group of 27 cases treated with watchful waiting was that every case improved to a point where they were discharged from observation and ten of these cases had developed knock-knees at the time of their last recorded visit. The average period of observation was 13½ months.

Judging from the outcome it is evident that the majority of this group of 31 followed cases were examples of physiologic bow legs as described by Blount.[1]

It was observed that children with physiologic bow legs frequently, and rather paradoxically, have pronated feet. This presents a confusing picture because treatment of the feet would consist of inner heel wedges which would seem to make the bowed legs worse. Actually, if the feet are treated with inner heel wedges and no outer wedges are placed on the shoes the genu varum will usually spontaneously correct itself and no harm will have been done to the feet by a period of weight bearing on the medial border of the foot.

SUMMARY

The records of 31 cases of bow legs in children were analyzed.

Four cases were treated by radical procedures and the remaining 27 cases were treated only with free bottles of cod liver oil and gentle home manipulation in a few cases. All 27 cases improved to a point where no further observation or treatment was indicated. Ten of the 27 cases had developed knock-knees when last seen. The frequent association of pronated feet and physiologic bow legs was discussed.

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PENICILLIN IN SCARLET FEVER. (Praxis, Bern, 37:355, Oct. 7, 1948). Vulliet-Baumann says that at his isolation department penicillin treatment for scarlet fever was begun in March 1948 and since then 35 children and 2 adults have been treated. A penicillin preparation with prolonged action, a so-called depot penicillin, was administered by deep intramuscular injections. Without regard to age, 100,000 units of penicillin was given on arrival and this dose was repeated once every twenty-four hours during the following three days. The authors were favorably impressed by the results of treatment with penicillin. Its use favorably influences the initial angina and prevents the development of complications during convalescence. The early disappearance of the streptococci permits a reduction of the isolation period, which formerly was set by the cantonal health department at forty-two days. They now have ruled that the period of isolation for scarlet fever patients be governed by the same rules as that in force for diphtheria patients; that is, patients can be discharged from isolation after three negative smears have been obtained at intervals of several days. Although in the city of Geneva patients are freed from isolation as early as the tenth day, at the author's hospital in Lausanne patients are usually kept isolated for twenty-three days, because complications are feared during early convalescence. The possibility of a considerable reduction in the period of isolation is welcomed; it greatly reduces the expenses of hospitalization.—*Journal A.M.A.*

THE TREATMENT OF ACUTE DIARRHEA IN INFANCY

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Acute diarrhea in infancy is very frequent in Egypt. More than 40 per cent of the patients seen throughout the whole year in the out-patient clinics of children's hospitals have diarrhea, and the frequency is higher than 60 per cent in the summer months. More than 30 per cent of the deaths occurring during the first two years of life are due to diarrhea and its sequelae. These figures show the importance of the problem of infantile diarrhea and its treatment.

TABLE 1. *Simple, Non-toxic Cases**

Drug Used	Side Reactions. % of Cases	Average Duration of Disease with Treatment	Relapses	% of Cure	Daily Dose
No drugs (diet)†..	....	3 days-weeks	45%	65%	.....
Entero-Vioform ..	....	7 days	30%	75%	0.05 gm. per kg. body weight
Sulfathiazol	10%	1½-2 days	10%	93%	0.12 "
Sulfadiazine	2%	1½-2 days	10%	92%	0.15 "
Succinyl-sulfathiazol	....	2 -3 days	12%	85%	0.25 "
Sulfaguanidine ...	....	2 days	10%	89%	0.2 "
Formo-Cibazol ...	....	1½-2 days	8%	93%	0.17 "
Combined Entero-Vioform & Formo-Cibazol	....	1½-2 days	5%	97%	0.05 " 0.17 "

We had occasion to make a comparative investigation of the treatment of infantile diarrhea with different drugs and with diet only. The following tables show that a combined treatment of diet and certain sulfonamides gave the best results, and also contain some hints on the choice of drugs.

The drugs investigated were entero-vioform, sulfathiazol, sul-

*Each group consists of about 100 cases.
†High protein, low carbohydrate and low fat.

fadiazine, sulfaguanidine, succinyl-sulfathiazol and Formo-Cibazol.* No additional drugs were administered and the sulfa drugs were given without alkalies. Specific diseases, which are known to be sulfa resistant, such as typohid, paratyphoid, etc., were excluded from these investigations.

TABLE 2. *Toxic Cases*†*

Drug Used	Side Reactions, % of Cases	Mortality	Relapses (in those who live)	Daily Dose with Best Results
No drugs.....	....	70%	50%	.....
Entero-Vioform ..	....	68%	50%	0.05 gm. per kg. body weight
Sulfathiazol	15%	35%	15%	0.12 "
Sulfadiazine	4%	35%	18%	0.15 "
Succinyl-sulfathiazol	....	50%	30%	0.25 "
Sulfaguanidine ...	5%	46%	30%	0.2 "
Formo-Cibazol ...	....	45%	25%	0.17 "
Combined Entero-Vioform & Formo-Cibazol	....	50%	25%	0.05 " 0.17 "

*Besides gastro-intestinal picture there is intoxication effecting particularly central nervous system, circulatory and respiratory systems.
†Each group consists of 15 cases.

It can be concluded from Table 1 that the sulfonamides are of great value in the treatment of simple infantile diarrhea. The best results were obtained with sulfathiazol, Formo-Cibazol and sulfadiazine, but sulfaguanidine and succinyl-sulfathiazol also resulted in marked improvement. Sulfathiazol and sulfadiazine caused some side reactions, though with the latter of no great severity. It is, however, not necessary to give these medicaments in cases of simple diarrhea as sulfaguanidine produced nearly the same and Formo-Cibazol even better results. The latter two sulfonamides are resorbed to a very limited degree only through the intestine and can be given in very high doses without any side-effects. Succinyl-sulfathiazol is a sulfa drug of the same type, but the percen-

*Formo-Cibazol was kindly supplied by Ciba Ltd., Basle, Switzerland; it is a combination of formic acid and sulfathiazol.

tage of cures obtained with it is somewhat lower, in spite of the high dosage of 0.25 gm. per kg. given. In the series of only slightly resorbable sulfonamides the relation between dosage and cure is optimal for Formo-Cibazol.

One group of patients had received Formo-Cibazol and enterovioform or allied preparations, e.g., diodoquin, simultaneously, and this group had the highest percentage of cures and fewest relapses.

Cases resistant to therapy with sulfa drugs should be suspected of amoebic infection, even if the stools are negative on repeated examination. We had a number of such cases which responded quite dramatically after the second or third injection of emetine hydrochloride.

Table 2 shows that toxic cases do not respond as satisfactorily to treatment with sulfonamides of the comparatively irresorbable type as do the nontoxic cases. It seems necessary to choose a sulfonamide of the resorbable type. The best drug is sulfadiazine owing to its high efficiency and its extremely low toxicity.

CONCLUSION

The number of cases of infantile diarrhea which responds to treatment with diet and sulfonamides is much greater than responding to diet only. The toxic cases are best treated with a sulfonamide of the resorbable type, the best being sulfadiazine etc., and the nontoxic cases, with a poorly resorbed sulfonamide, such as sulfaguanidine or Formo-Cibazol. Formo-Cibazol appears to be the best of the latter series, particularly if combined with one of the oxyquinolene group, and it would be advisable to carry out further investigations with this new drug.

CLINICAL REVIEW

In order to encourage the writing of clinical articles by recent graduates or senior medical students, the ARCHIVES *will publish monthly at least one such paper from the classes of Doctor Reuel A. Benson, New York Medical College, New York; Dr. Philip Moen Stimson, Cornell Medical School, New York, and Doctor John A. Toomey, Western Reserve University Medical School, Cleveland. Other interested medical schools are cordially invited to submit student papers for consideration.*

EMOTIONAL PROBLEMS IN TREATMENT AND PROGNOSIS OF EPILEPTIC CHILDREN*

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"The epileptic child should be regarded as something more than a convulsion with a positive electroencephalogram who makes a response of some type to the latest medication. He should be viewed as an individual who is struggling with an important problem. He should be given opportunity to express his attitudes toward that problem and these attitudes should be taken into consideration by his physician in dealing with him, his parents and his environment."[1] It is the duty of every physician to acquaint himself with the proper, complete treatment of epileptic children. Mere control of seizures with drugs represents perhaps one-third of the treatment program.

"If the statistics are accepted, epilepsy is as common as active tuberculosis, diabetes or crippling infantile paralysis."[2] One in every 200 of our population is epileptic,[3] yet . . . "as neurologists of the Selective Service boards who questioned the raw mass of young men can testify, many patients with the hippocratic disease either receive no care or treatment little better than that prescribed by Hippocrates himself."[4] Thousands have thus been condemned to live an incapacitated or narrow existence surrounded by restrictions due to the ignorance and distorted emotional attitudes of family, friends and family physician.

One cannot condemn too strongly the physicians, who through prejudice or indifference, cause irreparable mental stunting and often frightful tragedy to fill the lives of the children who are epileptic. Medical and dietary treatment can be found in detail in

*Submitted as partial fulfillment of the requirements of the course in Senior Pediatrics at the New York Medical College, Flower and Fifth Avenue Hospitals.

any pediatrics book. It is the purpose of this paper to discuss the third major aspect in the treatment of epilepsy, so-called "mental hygiene," more properly called emotional adjustment.

What Are the Emotional Problems Created by Epilepsy? To the epileptic child the convulsive seizure is a dramatic, horrifying experience which he views with apprehension and dread, approaching panic. Soon after his first or second attack he discovers that his mode of life is irrevocably changed. His friends view him with pity or revulsion, his parents usually prescribe innumerable restrictions on his play and social life, his school demands that he be withdrawn, and, in short, the future is filled with gloom and foreboding. Misconceptions about his condition abound, and the family often considers him doomed to mental and physical deterioration. Too often circumstances actually force this morbid outcome.

Gradually there evolves in the child a personality pattern which is unconsciously aimed at solving these problems. In a study of 1,000 epileptic children followed for 14 years at the Epileptic Clinic at Johns Hopkins,[5] the types of personality problems encountered in order of frequency were:

1. Insecurity (shyness, dependency, sensitivity).
2. "Spoiled child" reactions.
3. Antagonism and resentment to parents.
4. Difficulty in adjusting to groups.
5. Others: anxiety about seizures, sex delinquency, other delinquency.

These maladjustments are in idiopathic epilepsy superimposed upon the personality which Bradley[6] describes as characteristic of the epileptic child—"unprecipitated variability in mood, hypermotility, impulsiveness, short wandering attention span, vascillations in ability to recall material previously learned."

The parents in turn usually react in one of two ways. Most commonly they become overprotective, oversolicitous and excessively restrictive in their attitude, and thereby encourage dependency and infantilism in the child. They view the child as a chronic invalid unable to be left alone, and hold a completely pessimistic view concerning the future social and economic life of their child. Some parents, on the other hand, reject the child from the love and warmth of the family. The latter usually are motivated by

exaggerated feelings of guilt concerning the hereditary factors of the disease.

How Do Emotional Problems Affect the Course and Prognosis of Epilepsy in Children? "It is generally considered at present that an epileptiform attack is due to an 'explosion' of abnormal impulses in some portion of the brain, causing disorderly responses in the neuromuscular mechanism. . . . This presupposes an abnormal irritability of a portion of the cerebral mechanism. Most forms of treatment have been directed towards reducing this increased irritability."[7]

We can no longer deny the existence of psychosomatic interrelationships. Epilepsy, as in other organic diseases, is influenced by the "emotional tone" of the individual. Emotional tension and conflicts may affect the onset of epilepsy and may increase the number and intensity of convulsions, probably by increasing cerebral irritability.

In a study of 65 cases at Johns Hopkins[8] it was found that 6 cases had a history of specific psychological insult associated with the onset of epilepsy. These included the death of a parent, sudden separation from a parent, traumatic fright, etc.

Tension at home will increase the intensity of the disease, and relief of this tension will reduce the severity.

Bridge[9] describes two such cases: A 4-year-old child was admitted to the hospital with a history of having had 20 grand mal seizures a day for the past year. The child was obviously suffering from severe emotional maladjustment and, after intensive psychotherapy for 2 weeks, the seizures were first reduced to occurring only between 11 P.M. and 3 A.M. and finally only occasional fits of crying occurred between these hours. The home situation was successfully handled by a social agency and the child was discharged to her home. No grand mal seizures occurred in the year of follow-up. This is only one of the cases described in which the nature of the seizures was changed from grand mal to minor, easily manageable petit mal.

A 14-year-old girl was admitted to an institution with a history of having had convulsions since 10 days old, at present occurring about once a week. There was a strong familial epileptic trend. She had been on large doses of phenobarbital at home without improvement. At the institution the same dosage of phenobarbital

was continued, but the atmosphere of antagonism, resentment and discontent which existed at home was automatically excluded. This child had only one seizure for the entire year of institutionalization, which occurred one week after admission. Upon discharge she again had weekly convulsions. Unfortunately the home conditions had not been altered. This latter case demonstrates that even in a case of probable birth injury and familial tendency, the emotional disorder was a major factor in the course of the disease.

What Psychological Treatment May the Physician Suggest? After a 14 year survey at Johns Hopkins, this group concluded that *the major handicap* created by epilepsy is the problem of personality disorder produced by the negative emotional relationships surrounding the epileptic child from the onset of the disease. In those cases where this problem was avoided, the epileptic was usually able to make a satisfactory adjustment in later life. It is therefore extremely important for the ultimate prognosis of the patient that the physician be aware of these factors and be prepared to guide the family concerned.

The aim of treatment in conjunction with medical control of convulsions is the achievement of a calm sympathetic home environment necessary to prevent deterioration of the personality of the child.

The family of an epileptic child must be intelligently evaluated by the physician who is planning to work out the home management. It is far better for the child to remain at home than to be institutionalized, but this often requires monumental efforts on the part of the family. In some cases, where parents are uncooperative or where personality conflicts aside from this problem are in existence and create an atmosphere of tension and anxiety for the child, an institution may be preferable.

1. The nature and prognosis of the disease should be explained by the physician. Seizures usually decrease with age and at present the outlook for control of seizures by medical means is better than ever before. In most cases the parents are unaware of the excellent results now obtainable. It is important for the physician to encourage the parents, especially in the early period when the individual dosage is being worked out for the child.

2. The nature of the disease and the associated problems should be explained to the child as much as is possible for him to absorb.

He should be allowed, even encouraged at times, to give expression to his feelings about the disease. Ventilation of conflict and tension is a time-honored psychiatric technique and applies to epilepsy as in any other source of problems. The epileptic child is too often unnecessarily excluded from knowledge of his present and future prognosis.

3. It is essential that the parents learn to accept the convulsion as an incident in the disease, and between seizures treat the child in the same manner as other children. Calmness concerning the attack and avoidance of expression of fright or horror is essential. The parents may have to educate their friends and relatives to tolerate a convulsion should it occur in their presence.

4. The child should be allowed as much normal activity as possible in each individual case. Bradley,[10] Collier,[11] and others point out that physical and mental activity tends to prevent seizures. Hyperactivity and agitation which are often prodromal symptoms of a convulsion should *not* be treated with rest, but rather the child should be given opportunities to expend this energy. The parent must make a conscientious study of the child's daily activity, and only exclude those activities which are definitely potentially dangerous in the event of loss of consciousness.

5. It has been demonstrated at institutions that children are not excessively frightened by the sight of a convulsion and soon learn to treat it calmly when not influenced by adults' expressed fear or excitement. Thus the child's friends can often accept a seizure without undue discrimination of the child, with a little encouragement.

Should the Child Remain in School? Unfortunately the answer to this question is often theoretical. It is as important for the epileptic child to continue his education as for any other child. However, in 44 states epileptics are categorically barred from public schools.

First let us consider the question which is often presented—is the epileptic child mentally defective? There are certain cases of recurrent convulsions which are associated with other conditions producing mental retardation, for example, in some birth injuries, some traumatic injuries, etc. However, in children with idiopathic epilepsy there is the normal distribution of intelligence.[12]

Epileptic children of normal intelligence are benefited by school-

ing, and suffer emotional and intellectual deterioration from being barred. The American Epilepsy League has been conducting an active campaign urging communities to allow epileptic children to attend public school. In Baltimore,[13] the public schools have been persuaded to accept these children with the provision that they do not have more than two grand mal seizures a semester. A social worker works closely with the teachers and principal where necessary.

Since a wandering attention span is found in many epileptic children, Bradley has found that amphetamine sulfate in full adult doses before breakfast increases attention span, and improves the child's efficiency in learning.

In the average case, the only objection to the child attending school is the fear and distaste which the teachers have for witnessing the occasional grand mal seizure which occurs during school hours. If the parents can arrange for the local public school to adopt a more charitable and objective attitude the child should attend school. If not, private tutors may be obtained.

An interesting and encouraging project was undertaken by Twitchell-Allen[14] who attempted to educate a "deteriorated" epileptic patient. This man at 23 years of age had a 17-year-history of epilepsy and a mental age of 6 years 7 months. He had been removed from school at the age of six, and was at this time a dependent, incapacitated, "mentally retarded" institution patient. After intensive tutoring for 2 years, and substitution of diphenylhydantoin for phenobarbital his mental age was raised to 13 years 2 months and he was at home for the first time in 15 years, successfully conducting a small repair business.

Which Children Should Be Institutionalized? The aim of institutionalization is the same as home care, the prevention of deterioration of the personality and the development of the child's potentialities.

The desirable institution for epileptics is the type which is organized as a community on what is called the colony plan. Here the child is given a homelike existence with small groups of children in a cottage, and a housemother as a parent substitute. Occupational therapy, education and adequate nursing and medical care are the advantages of the colony.

Davidoff[15] states that the criteria for institutionalization is not

the mental or physical level of the child, but rather depends on the social and environmental conditions at home. Whenever possible, institutionalization is avoided. There is no adequate therapeutic substitute for a warm, sympathetic family life.

What Vocations May the Child Hope to Function In? The general principles of vocations to be avoided[16] are any type of driving of an automobile or truck, working at heights, or operation of any tool or mechanism in which loss of control may injure others, as a steam shovel, welder's torch, etc. When planning for vocational training, the child's aptitudes and ability must be realistically appraised.

Lennox and Cobb[17] found that 51 per cent of epileptics can do full time work and 28 per cent can do partial work. In his study he found epileptics in as varied fields as salesman, farmer, clerk, laborer, mechanic, professional fields, including physician. An experimental group of 93 epileptic students at Northwestern University were studied by Himler and Raphael,[18] and they found that 68 per cent of the group were attaining acceptable grades, and 29 per cent had shown improvement of their disease.

CONCLUSION

This paper is essentially a plea for physicians to treat epileptic children totally. A desirable control of seizures, and ultimate adjustment of the epileptic cannot be obtained unless the emotional problems are considered and handled. The work of the last 15 years has shown conclusively that intelligent psychological treatment can make the difference between a totally incapacitated child with frequent major convulsions and a happy child with a fairly bright outlook.

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ACUTE OSTEOMYELITIS OF INFANTS AND ADOLESCENTS. (Semaine des Hopitaux de Paris, 24: 3069, Dec. 18, 1948). Favreau reports 30 cases of acute osteomyelitis in infants and adolescents. Ten patients between the ages of 2 and 19 years were treated before 1937, i.e., before the era of the sulfonamide compounds. Treatment consisted of trephining of the medullary canal, curettage of the necrotic zone, autovaccine and plaster cast. Two patients died. The average hospital stay was two hundred and fifty-four days and the average time required for recovery was twenty-six months. Ten patients between the ages of 4 and 15 years were treated during the period from 1939 to 1944. Treatment consisted of local and oral administration of sulfonamide compounds in addition to trephining, curettage and plaster cast. There was not a single fatal case, the average hospital stay was sixty-nine days and the average time required for recovery was seven months. The response of the infants to the treatment with sulfonamide compounds was better than that of the adolescents. Pneumococcus rather than Staphylococcus aureus was demonstrated as the causative agent in the infants. Ten patients between the ages of 2 weeks and 11 years were treated during the period from 1944 to 1946. Treatment consisted of local administration of sulfonamide compounds and injections of 200,000 to 630,000 units of penicillin in addition to trephining, curettage and plaster cast. There was not a single fatal case, the average hospital stay was thirty-three days and the average time required for recovery was three months. Mortality disappeared. The course of the acute osteomyelitis was influenced most favorably by chemotherapy combined with surgical treatment.—*Journal A.M.A.*

PEDIATRICS HALF A CENTURY AGO

From time to time the Archives, which was the first Children's Journal in the English language, will reprint contributions by the pioneers of the specialty over fifty years ago. It is believed that our readers will be interested in reviewing such early pediatric thought.

RELATION OF THE BACILLUS OF SHIGA TO THE SUMMER DIARRHEAS OF CHILDREN*

DISCUSSION BEFORE THE MEETING OF THE AMERICAN PEDIATRIC SOCIETY HELD AT WASHINGTON, D. C., MAY 12-14, 1903.

DR. SIMON FLEXNER, of Philadelphia, opened the discussion thus:—

"Mr. President and members of the American Pediatric Society, I wish to express my great pleasure at the invitation extended by your officers to present to you my experience, gathered chiefly during the past summer, in respect to the bacteriology of the dejecta of the intestines in cases of so-called summer diarrheas, which may be of some use in clearing up at least the gravest of cases of this very important and hitherto very obscure disease. You all know, of course, that there has been no want of effort to discover the cause of these diarrheal diseases, but very little, if any, definite information has been gathered or had been gathered, with reference to the cause of diarrheal diseases, until the observations of which I shall speak. You are all familiar with the work of Escherich and his pupils, of Booker and other investigators in this country, and familiar with the fact that their results have left the etiology of the diarrheal diseases of infants without a solution. We have according to their results a number of possible etiological factors, chiefly bacteriological, present especially in cities, which may or may not be the causes of such disease. During the last few years the introduction of a slightly new method of approaching the subject of the bacteriology of certain forms of dysentery has met with such success in unraveling this complicated and very difficult disease in adults that it seemed that perhaps the application of the same method to the study of the bacteriology of the diarrheal diseases of infants might yield similar results or results at least of value.

I became interested in the study of dysentery some three or

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four years ago, while on an expedition to the Philippine Islands. While there we had the opportunity of studying a considerable number of cases of acute dysentery in adults, and had no difficulty in establishing the existence in these cases, both in the dejecta and in the pathologically altered intestine, of a microorganism, perfectly well defined, differing from the ordinary intestinal bacilli which we are familiar with, an organism which had only a short time before been described as the cause of an outbreak of dysentery in Japan by the man whose name it bears, Shiga. Now, Shiga introduced a modification of the method that led to his success and to the success of others in the same field, to which, I think, all our progress is due. He conceived the idea that if, among the host of organisms that can at all times be cultivated from the diseased intestine, the organism causing the pathological lesion were there, the chances were that it would produce such changes in the blood as to cause agglutination and thus show its relation to this pathological process. He observed that by means of the so-called Widal test it was possible to pick out of all organisms which might be isolated in cultures from the stools in typhoid fever that particular one which probably is the cause of the disease. He worked, as I stated, with an epidemic of dysentery—these epidemics of dysentery in Japan were common occurrences—and as a result he discovered that in all cases a single organism was picked out by means of this agglutination reaction. When he came to study the properties of this organism he found that it differed from all the ordinary bacilli. Then he found that it agreed perhaps best with typhoid bacilli. It differed somewhat from the typhoid bacillus in certain points; these permitted its detection and separation from that group of organisms. I think now that this bacillus of Shiga has come to be recognized as the cause of a definite group of cases of dysentery in adults. Since that time his observations have been confirmed by the Johns Hopkins Commission which was sent to the Philippine Islands, by Kruse, of Germany, and indeed in the last few years by bacteriologists and pathologists wherever these cases have occurred and wherever bacteriological science is pursued. There is, therefore, an unanimity of opinion among them that there is a definite bacterial form of dysentery which differs from amebic dysentery and which is marked out as a definite disease. It was with these results in mind that I thought it worth

while to turn to the study of diarrheal diseases in children, and I very early secured the cooperation of Dr. Knox, who was in charge of the Wilson Sanitarium near Baltimore, and of Mr. Bassett, and of Mr. Duvall, a bacteriologist who had had previous experience in the study of dysenteric diseases in this country, in which he had demonstrated the occurrence of the Shiga bacillus. It was possible to study at the Wilson Sanitarium something like 50 cases of the diarrheal diseases of infants. I cannot tell you anything, I regret to say, about the clinical data with reference to these cases; I am not a clinician and things which would appeal to me probably would be very gross and of little use to you in the types of the disease in which this organism was found. Of the cases which came to the sanitarium, about 52 cases were taken just as they presented themselves, without any selection whatever, and studied with reference to the occurrence of this organism, and it was found that in, I think, 45 of the 52 cases, perhaps a few more, the bacillus of Shiga was present. It was also found that not only was this bacillus of Shiga present, but that the blood serum of children who had this bacillus in the intestinal mucosa reacted with the organism in question, and often with organisms obtained from the dejecta of cases of dysentery in the adult, with organisms which I had obtained in the Philippines, and with those obtained by Kruse and others. It seemed, therefore, that this much could be stated: In a large proportion of the cases of summer diarrhea which came to the Wilson Sanitarium during the past summer, or at least during some weeks in the summer, which were examined bacteriologically, there could be obtained this microorganism, which is, I think, pretty well established as the cause of a definite type of adult dysentery. The cases in which the organism was obtained were cases in which blood and mucus appeared in the stools. That much I can tell you; what the other clinical facts are I really do not know.

We found that the organism is not easy to obtain on account of its similarity to other intestinal organisms from formed stools or from feces. Our success depended largely upon the condition of the stools. If blood also occurred along with the mucus in the stools, the organisms were obtained with even greater ease than when mucus occurred with an absence of blood. So an appearance of mucus and blood in the stools led us to feel that the organ-

ism would always be obtained. That is about the status of the studies so far as they were carried out last summer, and that is the basis for the most part for any notion which may exist that the bacillus of Shiga is concerned with the causation of a group of cases of the summer diarrheas in infants. It was not possible to carry out these studies during the summer in other places. In Philadelphia we did not have good opportunities to study children in this way, but we did have a few cases. This is, however, no indication whatever of the number of cases which occurred there, but they represent all of the cases which we had access to.

There are one or two points of great practical interest which I should like to bring to your attention. I feel that those interested in the bacteriology of the diarrheal diseases of children should undertake to discover whether the disease as it will appear this summer is the same; I should like to know what your experiences will be. I should like to speak to you as one who has had his difficulties with the isolation of the bacillus of Shiga in order that you may not draw too hasty conclusions as to the presence or absence of this organism. In the first place, I think it is desirable that those who are intending to study the bacteriology of the intestinal flora of infants suffering with diarrheal diseases should take advantage of the opportunity to familiarize themselves with the bacillus of Shiga before the studies are begun. It is, in fact, a very easy organism to cultivate, and it does not offer any very great difficulties in learning its properties; but the real difficulty comes from the fact that the organism is not so very different from the colon bacillus and from the typhoid bacillus, as observed under ordinary conditions, so that one who is not familiar with it might easily be led astray in his work and in his conclusions. So it seems to me that any work that is contemplated should be preceded by a study of the organism itself. I shall be only too glad to send cultures of the organism to any one who has a desire to study it.

Now there is another point. The mere knowledge of the organism is by no means an assurance that you will be able to pick it out of the mixture of organisms which always occur in the intestines. There are tricks in the trade of bacteriology perhaps, as in all other trades, and the knowledge of the tricks will facilitate very greatly the accomplishment of the purpose that you have in

view. The trick which helps one very much in picking out this organism is the following one: If you make cultures of the dysentery bacillus and close up the plates, at the end of twenty-four hours you will have abundant growths of the dysentery bacillus, but if you mix colon bacillus and dysentery bacillus and, having sowed this mixture in plates, put these to develop in the thermostat, you will find that the dysentery bacilli, when mixed with the colon bacilli, are considerably restricted in their development. If, therefore, you transplant at the end of twenty-four hours, you will get almost no dysentery bacilli and almost all colon bacilli. The thing to do is not to transplant any colonies after twenty-four hours, because the colon bacillus is so far ahead in its growth of the dysentery bacillus; and if you wait for an additional twenty-four hours you will not be much helped, because you will only have more colonies to confuse you. The trick is to take a blue wax pencil and mark out on each plate in a blue streak the colonies present at the end of twenty-four hours, and make up your mind that you will have nothing to do with them. Put the plates in the thermostat and then regard every colony that has come out after the first twenty-four hours as suspicious. You can tell at once by the blue streaks which of the colonies came out in the first twenty-four hours.

Now it is in the second group that you will most likely find the dysentery bacilli. You will find in some cases that the number of dysentery bacilli which are obtainable far exceeds the number of colon bacilli which have come out in the twenty-four hours. We had one such case in Baltimore last summer. There was practically a pure growth at the end of forty-eight hours and the colon bacillus was practically absent during that period. Often under favorable conditions in which you have blood and mucus in the stools, you transplant and get many suspicious colonies, perhaps eighteen or twenty; but in some cases you may get only one, two or three colonies of the bacillus of Shiga and many other colonies, colon bacillus, etc. I think I can predict that many of you will fail to find the organism even when it is present.

Then there are one or two other points which I might mention to you. As a result of the studies of Shiga and of the commission which went to the Philippines, and of Kruse in Germany, it was concluded that there were certain variations in agglutination. The studies of Dr. Hiss in this country, independent of those which

have been carried on since by Dr. Park in New York and Dr. Gay in Philadelphia, and others, have shown us that the dysentery bacillus does not represent a single type but that it has group characteristics. There are two well defined groups of organisms. The one when grown upon mannite will not make any change upon the litmus. But the second type of the organism, which has all of the other cultural properties of the first, does produce a change in the litmus. They have certain relations, yet certain differences, so that each one retains in a way its certain individualities. We cannot say, if we admit that this organism is the cause of dysentery in infants, that one or the other type is especially concerned with the infection. We have found that the types occur somewhat irregularly, in an epidemic; we may find one type in one epidemic, another in another epidemic, that is in adult dysentery, and in some epidemics we may find both types of the bacilli occurring. All this indicates that the dysentery bacilli represent a group rather than a special or specific type of organism, just as we now recognize the colon group, etc., of organisms. It is of very great importance, both scientifically and otherwise, to have discovered these two types of organism, and it is furthermore important to know that these types vary. As we have stated, the particular type which has been obtained from cases of diarrheal diseases of children does not ferment with acid production on sugar, but both of them do on glucose and some on mannite. This year we have found one that agrees with the original Shiga type, but I do not think we have pursued this subject very carefully. These facts have come out since our study last summer, and it is very important that the investigations shall be taken up and carried out during the present summer. And I think it is safe to say that before the summer has gone we shall know, not only more about the diarrheal diseases, but also very much more about the types of the organism which are concerned in its production, whether it is one type or both types combined. Everything is left to the future, we have simply made a start. We have established the presence in these diarrheal diseases of an organism which previously had not been discovered in them. We have evidence of its pathogenic action. It is the future which must determine what position this organism must occupy with reference to the etiology of the summer diarrheas."

DR. W. H. PARK, of New York, spoke as follows:—

"My personal interest in the subject under discussion started with an experience last summer at Seal Harbor, Me., where Dr. Flexner and I happened to be visiting at a time when there was a slight epidemic of dysentery. At Dr. Flexner's suggestion Dr. Dunham and I looked for and found that the mannite fermenting type of the dysentery bacillus was present. When I returned to New York, I found to my surprise that in towns along the Bronx River, just north of New York City, there had been about 500 cases of dysentery among a population of 30,000. The sick were mostly children, though some were adults. The patients had characteristic dysentery; pain, tenesmus, blood and mucus, some vomiting and other symptoms. The mortality was about 4 per cent. Both varieties of dysentery bacilli were present. Shortly after that a preliminary report of Dr. Flexner's assistants, Duval and Bassett, on the bacteriology of summer diarrheas came out. The conclusions arrived at by them clashed with my ideas and stimulated me to look further into the subject. There developed a few points which may be of interest. First, the agglutination test in dysentery is not going to be as easy to interpret as in typhoid. When an attack of summer diarrhea occurs in a previously healthy child, we can depend upon the serum reaction, but I found that a 1-10 reaction is very common in children having chronic intestinal diseases when no dysentery bacilli have been present. In adults where there is a chronic or subacute disturbance of the intestinal tract and no dysentery bacilli, we frequently find reactions between the serum and the mannite fermenting type of bacilli, in dilutions of 1-50 and even much higher. In the Bronx epidemic I found the children there giving strong reactions in convalescence. After three months the strength of the reactions diminished greatly, proving the agglutinism to have developed in the blood because of the dysentery. It averaged 1-30 at first and fell to below 1-10. There are other bacilli besides those belonging to the dysentery group whose injection into animals is followed by the development of agglutinating substances which clump the dysentery bacilli. I found in a number of cases of chronic dysentery in adults and in several children such bacilli, which in cultural characteristics were almost identical with the colon bacillus. These bacilli occurred

more often in subacute and chronic cases than in acute cases. In New York City, where we had very little dysentery, children having diarrhea not accompanied by mucus and blood did not as a rule give a serum reaction with the dysentery bacilli, and I do not believe the dysentery bacilli were active in these cases. The results might be quite different in a town, or even in a city, where there happened to be a great deal of infection. It seems to me this must have been the case in Baltimore. From my own slight experience, therefore, and from the reports of others, I feel that the dysentery bacilli do not occur in the large proportion of cases of summer diarrhea, and I should expect mucus and blood in most cases where the dysentery bacillus is an important factor."

DR. HENRY KOPLIK, of New York, continued the discussion:—

"I think that the subject of summer diarrhea is a very complex problem. Ever since the advent of modern bacteriology it has received extensive study. One among us, Dr. Booker, has made an international reputation in this field. In fact his studies on summer diarrhea will ever remain classical. He has met with microorganisms which, if they do not correspond exactly with what Dr. Flexner has described, certainly belong to the same group.

In considering the subject of summer diarrhea, we must first take into account that all practitioners who see any amount of summer diarrhea in children recognize certain broad definite classes of cases. In the first place, the great mass of illness in the summer time is found among artficially fed infants, and in that class we find a number of diarrheas which are the result primarily of the anatomical and physiological insufficiencies of the gut. We introduce into the baby's stomach a foreign element, that is cow's milk, and the gut is subjected to constant traumatism, as it were, from an anatomical and physiological standpoint. The first group of disturbances, which every one has met, is the dyspeptic group. This gradually then merges into other groups. If the milk is correctly modified or its administration suspended and something more digestible substituted, the digestive disturbances cease and the baby is practically convalescent. We must recognize this group because it is a very important one, and one that generally appears before other sets of symptoms belonging to the other groups of diarrhea make their advent. In other words, the dyspeptic attacks

are due to an anatomical and physiological inability of the gut to cope with a foreign element, cow's milk. A great many of the severe summer diarrheas of infants are started in just this way.

The second group, I think, belongs to that class of diarrheas which are caused by the microorganisms in the food itself; that is, in the cow's milk, which, no matter in how cleanly a manner it is collected, carries with it a certain number of organisms which, if allowed to proliferate in this medium, will cause digestive or even inflammatory disturbances. This is a distinct class of cases, so distinct that its history reaches far back before the days of bacteriology. To this group would belong the cases described by Biedert, Escherich and Booker due to the bacillus of butyric acid, in which there are a very considerable number of very foul smelling, acid stools, also those due to the bacillus lactis aerogenes. These form a very large group of cases in our dispensaries and clinics and by far the largest group of cases of summer diarrhea. They are the cases due to the bacteria in the food itself, indigenous in the milk.

The third class of cases of summer diarrhea are the infectious cases. They are a distinct and independent class and have very little to do perhaps with the bacteria of the food itself. Some microorganisms, as Dr. Snow has pointed out, have been introduced into the body from without. In this group belong the staphylococcus infections. Examining the dejecta of such babies, we have been struck by the peculiarities of the cases described as streptococcus infections by Booker and Escherich. The stools are peculiar; they have certain characteristics with certain clinical features.

Another set of cases belonging to this infectious group is the one which has been mentioned by Dr. Flexner, and this class has been the subject of investigation for the last four or five years. Ever since the discovery of Shiga, the pupils of Escherich and Escherich himself have been studying this set of diarrheas; the socalled bacillary diarrheas. The bacilliary diarrheas occur for the most part in older children. They may occur in very young infants and they have been found to occur in institutions, or in certain localities. They are a distinctly limited class of diarrheas. How large this class is, future studies will show. Escherich and his pupils found in these diarrheas a bacillus which in its reactions

exactly corresponds to the Shiga bacillus and which, according to Escherich, gave the agglutination reaction, as in Dr. Flexner's cases, but Escherich hesitated to say that the Shiga bacillus and this bacillus were exactly identical, or that his cases were true dysentery. Dr. Flexner in his remarks indicated why he himself had hesitated, because this is a class in which there are a number of bacilli which resemble each other closely. Dr. Park has shown you also that the agglutination reaction obtained in this class of cases is more or less uncertain. In my own service I had a number of cases last summer, and we have been trying to obtain some definite results in the etiology and bacteriology. In none of our cases could we be absolutely sure that we obtained the bacillus described by Escherich and his pupils and Flexner and his pupils. I do not say that Flexner's bacillus and Escherich's bacillus are identical, but they do certainly belong to the Shiga group. We are not ready to assume that this set of summer diarrheas belongs to the dysenteries.

I have tried to mark out how complex this whole subject is. There is another point which I wish to dwell upon. I do not know that I stand apart from the rest of the pathologists and bacteriologists when I say that in some cases of diarrhea these bacteria combine to form a complex etiology; that is, diarrhea in a baby may be due to several causes. It is not always that you find the streptococcus or the staphylococcus the actual cause, pure and simple. As to this particular Shiga group I would hesitate to say at present how great the class is. I am inclined to think with Dr. Park and with Dr. Escherich that the group is a limited one. That it does not include all the forms that we see in large cities, that it does not take in the forms which I think are gradually being controlled by our modern methods of infant feeding among the poor from distributing stations, which give these little patients clean milk. I have received children under my care who I am sure would have died in the days preceding the agitation on sterilized milk. We have saved them, and they belong to the second class of cases in which the bacteria, indigenous in the milk itself, had been allowed to grow and get the upper hand. These bacteria were introduced into the intestinal canal of the infant with the decomposed milk and caused trouble.

The clinical and bacteriological study of summer diarrhea should go hand in hand."

DR. L. EMMETT HOLT, of New York, continued the discussion:—

"During the past season, from October till May, considerable work has been done in the Babies' Hospital upon the Shiga bacillus and the diseases in which it has been found. In the laboratory of the hospital, Dr. Wollstein has studied bacteriologically the stools from 112 children, in most of the cases a number of examinations being made. These cases were taken at random and included all kinds of intestinal disturbance. The Shiga bacillus was found in 37 cases. These 37 all had symptoms of colitis and most of them were acute, usually beginning with fever which frequently was as high as 103° F. The stools showed much mucus and often they contained blood. In no case where both blood and mucus were present was the organism absent, although it was not found in all the cases where the stools contained mucus, even though the quantity of mucus was considerable. Ten of these cases occurred at the Babies' Hospital, three at the Nursery and Child's Hospital, twenty-four at the New York Foundling Hospital. Rarely were isolated cases seen, in nearly every instance several occurred together in a ward.

Characteristic blood reactions were obtained in all the cases. These were irregular in their appearance during the first week, although they were obtained in one case on the second and in another on the third day of the attack. During the second week most of the cases gave positive results. The reactions were present in one when it was discharged from the hospital, twenty-seven days after the attack. Ten newly-born and ten healthy children were examined, and in no one was the blood reaction obtained with the Shiga serum. The bacilli persisted in the stools for a considerable time after the attacks; in 1 case they were found six weeks and another four weeks after.

Fifteen autopsies upon cases of Shiga colitis have been studied by Dr. John Howland. There were no characteristic anatomical changes which accompanied this form of infection. Nearly all varieties of inflammation were met with except the croupous form, which was not seen in any of the cases. In the 6 acute cases there

was an intense congestion of the mucous membrane, with areas of necrosis more or less extensive. In the 5 subacute cases there was follicular ulceration which was usually superficial. In 2 cases of terminal infection only a slight congestion of the mucous membrane was present.

Flexner's anti-dysenteric serum was used in 8 cases. In 3 of these very striking improvement appeared to follow its administration. Two children were practically moribund when it was given; in 3 others no effect was seen.

The number of cases of course is too small to admit of any deductions. The conditions in the intestines are so complicated, it is doubtful whether we shall see the striking benefit following the use of diphtheria antitoxin. The close relationship between a certain type of inflammation of the colon, viz., that with blood and mucus in the stools, seemed clearly established by these investigations."

DR. J. H. M. KNOX, of Baltimore, spoke as follows:—

"I am exceedingly interested, as we all are, in this discussion, and I have learned a great deal. I had charge last summer of the Thomas Wilson Sanitarium and a word or two about the clinical records of the cases referred to by Dr. Flexner may be of interest.

The Thomas Wilson Sanitarium is about ten miles from Baltimore, and on that account it was difficult to obtain the children very early in the disease. This is a difficulty which Dr. Booker and others have always had in that institution; the children are usually sent to us pretty sick after they have been treated, for some days at least, in the city. Of the cases in which the organism was isolated, at least ten presented the acute symptoms recognized as those of fermentative or dyspeptic diarrhea. They had a history of an acute onset with fever, vomiting and diarrhea. The stools were first semi-fluid, then fluid; and finally, having lost their fecal character, became mucoid, the mucus being infrequently tinged with blood. In these cases, however, the blood was not excessive, only an occasional fleck in with the mucus; and in several of these instances, two or three at least, we found no blood at all, and the organism was recovered from the portions of the stool which were either clear or greenish mucus. A large number of these 42 cases I think belong to either the subacute or chronic type, in which the

child came under our observation late in the disease, and the stools contained a great many leukocytes and more blood. There were only a few cases, however, in which the blood was excessive.

I would not assert that all of our cases, more than three hundred in number, of the socalled summer diarrhea were caused by this organism, but so far as could be told there was nothing either in the clinical history, the character of the stools, or the pathological condition at autopsy, to enable one to differentiate our cases from those recognized as typical epidemic summer diarrhea. I should like to corroborate what Dr. Holt has said in refernce to the pathology of this condition. In several instances there were no gross lesions at all; the intestine was covered with an excess of mucus. There was no ulceration whatever, but quite a marked enlargement of the mesenteric lymph nodes, and a pale and rather thinned out condition of the mucosa. In other instances we found definite ulceration beginning, as he has said, with small ulcers on the solitary follicles. In none of the cases last summer did we find extensive ulceration, but the cases were clinically like those of the preceding summer, in some of which we found very extensive ulceration associated with marked thickening of the whole wall of the large intestine. I think it is important to emphasize the fact that the cases which were sent to the sanitarium came from all sections of the city, that is, they formed a part of the usual epidemic of diarrheal disorders annually recurrent in large cities during the warm months. Furthermore, we had blood sent to us from other cities from babies similarly affected, and it agglutinated the organisms isolated from our cases. In several cases seen outside the sanitarium, either the organism was obtained from the stool, or the blood agglutinated the Shiga bacillus.

I feel, therefore, that while it is necessary to have this work confirmed, we can at least be hopeful that a fairly large group, both of the acute and chronic cases of summer diarrhea will be found to be due to this organism."

DR. BOOKER, of Baltimore, then spoke, as follows:—

"It has been so long since I have worked in the laboratory that I have almost forgotten my own work, and feel somewhat embarrassed in returning to the subject. I can not speak from personal experience in regard to the bacillus separated by Duvall and

Bassett from the diarrheal feces of infants last summer. There are many points to be considered and problems worked out before the relation between this bacillus and the summer diarrheas of infants can be determined. Whatever the relation may prove to be, the separation of the bacillus from the colon group, and the careful study which has been made of it by these two young men, is of great scientific interest, and may be regarded as one of the most important and satisfactory works that has been done in bacteriology in this country.

When I left the laboratory study of the summer diarrheas of infants I had come to the conclusion that it was a very complex subject, comprising a number of affections, in which most of the organs of the body are often implicated, and in which many different varieties of bacteria are concerned, the most important of which belong to the streptococcus group.

I have isolated between thirty and forty varieties of bacteria from the intestinal contents of infants affected with different forms of summer diarrhea, and at the first meeting of this Society, in 1889, I described among other bacteria, the separation of seven varieties of the colon group. From the morphology, cultural resemblances, and especially the milk reaction, the variety which I described as bacillus M appears identical with the bacillus of Duvall and Bassett. At the following meeting of the Society, in 1890, I reported a case of ulcerative catarrhal dysentery in which special attention was called to a bacillus found in large quantity in the diseased colon, which closely resembled the colon bacillus, but differed from it in not coagulating milk or reducing litmus.

Owing to the large number of varieties of bacteria upon which I was at work, and the limited means at my disposal for animal experimentation, the pathogenic properties of only a few of them could be tested. Some of these which were found in large quantities in the intestinal contents proved strongly pathogenic to lower animals. Other workers in this field have similarly found a number of varieties of bacteria, possessing pathogenic properties, in large numbers in the diarrheal feces of children. These considerations together with the manifold variety in the clinical features and anatomical changes in summer diarrheas speak against a specific excitor for these affections.

The Shiga bacillus is said to have been found by Duvall and

Bassett chiefly in cases having mucus and blood in the stools. This does not give us much information as to the condition of the intestine. It is important to distinguish between clear mucus and muco-pus, and pure blood and blood mixed with pus in the stools. Pus is the ingredient in the stools which indicates ulceration of the intestine. Mucus is secreted and poured into the intestinal canal in large quantity. Under normal conditions so much of this is reabsorbed that only an imperceptible quantity passes out with the feces. When mucus appears in the stools in clear lumps it may be the result of very slight abnormality in the intestine, without any pathological lesions whatever. It is when mucus is clouded by leukocytes that it represents a serious condition of the intestine. So with blood in the stools. When pure, even in considerable amount, it may not signify a serious condition of the intestine. It is when blood is persistent, and especially when mixed with pus that it should cause apprehension.

The only case that came under my observation last summer in which examination was made for the Shiga bacillus belonged more to the cholera infantum type than the dysenteric. The child had been sick only a few days, and had not lost much flesh. It was slightly toxic, and had frequent watery stools, with very offensive, putrid odor, and without mucus or blood. From the condition of the child and nature of the stools, I felt confident that cultures would show large numbers of proteus vulgaris. Contents from the rectum were taken with a glass tube and delivered to Mr. Duvall within a few hours. He reported the cultures as almost pure of the Shiga bacillus and containing no proteus bacilli.

Two injections of Flexner's serum were given to the child. A very slight improvement was noticed after the first injection, but a more decided change for the worse followed the second injection, and the child died a few days later.

As to the serum treatment of the summer diarrheas, we should not be too sanguine in our hopes. Even if the Shiga bacillus should prove to be the important exciting factor of these affections, as has been so confidently claimed for it, we cannot exclude the participation of other bacteria in the disease. It is also well to remember that we often have serious pathological lesions, deep and extensive ulcerations of the intestine, and more or less important changes in other organs of the body to deal with.

Care should be used in estimating the effect of serum upon the disease. In no other disease does recovery so often happen from apparently hopeless conditions, and under most diverse methods of treatment. Seven years ago I used Marmorek's streptococcus serum in a number of cases of streptococcus enteritis. Decided improvement followed the use of the serum in every case except one, but it was only temporary and all of the cases died. In 1 case in which streptococci were the predominating microorganism in the stools, the improvement after injection of the serum was startling. The child was twenty-one months old, and had been sick with enteritis four or five weeks. It was in a state of coma with small, feeble pulse, which could scarcely be felt, and had cyanosis over much of the body; 10cc. of Marmorek's serum was injected under the skin about 10 A.M. In the afternoon the child had regained consciousness, had a fair pulse, the cyanosis had completely disappeared, and the child was able to take the bottle. The improvement was of short duration, and the child died in spite of repeated doses of serum.

In the use of Flexner's serum, I think, if we get results from it, it will be when used in the early stage of the disease, before serious anatomical changes have occurred, and other organisms are brought into participation. It has been suggested that the rôle of the Shiga bacillus is to render the conditions in the intestine more suitable for the activity of other bacteria. If this should prove true, it is still more important to use the serum in the early stage of the disease."

DR. FLEXNER closed the discussion:—

"I wish to thank the members of the Society for the very full way in which they have discussed this condition. I have been myself very much helped by the facts and the views which they have stated. I quite agree with the gentlemen who dwelt upon the complexity of the problem, for it is by no means easy. I thought I had made myself clear that I am not committed to any view of the causes of summer diarrheas, excepting that this organism occurred in some of them. It remains for the future to determine just what the limits of this occurrence are, what the importance of this occurrence may be, and how the pathology and bacteriology may be brought into harmony. I do not think that

one can speak positively upon that subject now. I think the autopsy records add very greatly to our knowledge of the character of the lesions associated with this disease. Our experience at the Wilson Sanitarium was so limited that it hardly seems worth speaking of; but with the reports now of fifteen autopsies we see something of its possibilities.

There are two points which I should like to touch upon briefly. The first is that I am convinced that whatever the Shiga bacillus does, it does early. We have to deal with mixed infections, and how much of this complex mixture is a condition of an early infection is a very important question. How much damage the streptococcus and staphylococcus, which are constantly present, can add to the effects of the other bacilli, I think, is a point that should be kept in mind. The serum is, of course, experimental. It must be remembered at the outset that this serum attempts to deal not with a disease, the effects of which are due to a poisoning, as is the case with diphtheria; hence it is not a serum which acts as a therapeutic agent alone. What we have to deal with in this disease is an organism, and our serum must be able to attack the bacteria themselves and bring about their destruction. We have a recent communication from Kruse, who has used the serum in adults in Germany, with excellent effects, he thinks. What this serum will do in the cases of children is a matter to be settled by experience. But its good effects are likely to be gotten if it is used early. Of course, in dealing with a large number of cases, many of them would have gotten well without it, but if you wait until the symptoms are more severe, the outcome is doubtful. As Dr. Booker said, the serum for hopeful therapeutic effect should be given early. The serum as tested on animals is very effective. It rescued guinea pigs from infection almost without exception. I think it is at least worth trial, but whether it is to be used or not is to be decided by bacteriologists and clinicians."

CLINICAL-PATHOLOGICAL CONFERENCE

WILLARD PARKER HOSPITAL, NEW YORK

Meeting held May 17, 1949

DR. PHILIP MOEN STIMSON, presiding.

MENINGOCOCCIC MENINGITIS

Dr. Silverberg presented Case No. 1537, a 12-year-old Puerto Rican female, who was admitted to Willard Parker Hospital on March 28, 1949, and expired about 40 hours later. She, and her five-year-old brother, were admitted via ambulance, both with the very meager history of vomiting and fever for three days; and delirium for a few hours previous to admission.

Physical Examination. The patient's temperature was 102° F. She was stuporous and irrational; her respirations were deep and rapid; her skin was hot and dry, and the turgor was poor. Blood pressure was 130/80, and there were several small petechial hemorrhages over the body. The only other positive physical findings were related to the neurological system: 1. There was marked nuchal rigidity. 2. The Brudzinski and Kernig were positive. 3. There was a bilateral Babinski. 4. The abdominal reflexes were absent, but the deep tendon reflexes were present and equal bilaterally.

A spinal tap done on admission, revealed grossly purulent spinal fluid. The cell count was 5,000 with 95 per cent polys. The sugar content was less than 10 mgm. and many gram-negative diploccoci were found on smear. A diagnosis of meningoccic meningitis was made, and the patient was started on sulfadiazine intravenously, and on intravenous fluids. During the first 12 hours she received 6 grams of sulfadiazine by intravenous drip (total of 8 grams till death).

Hospital Course. The patient's condition remained essentially unchanged, until about 14 hours after admission. At that time it was noted that the patient's respirations gradually slowed, and then ceased altogether. The patient became cyanotic, and artifical respiration was started until a resusitator was obtained. In spite of these measures, suction, coramine and caffeine stimulants, no spontaneous respiratory movements could be elicited. The pulse

remained good throughout. About an hour and a half later, an intratracheal tube was inserted, and the patient was placed in a chest respirator. She received oxygen by way of the intratracheal tube, and was suctioned as necessary to remove the mucus which had accumulated in the pharynx.

During the next 20 hours there was not much change in her condition. She was breathing by means of the chest respirator; her pulse was rapid, but good, and she was receiving fluids and sulfadiazine intravenously. Suddenly, 20 hours after her original episode of respiratory embarrassment, the patient's condition became much worse. She became markedly cyanotic, and her pulse was almost imperceptible. A large amount of sanquinopurulent fluid was obtained from the mouth by suction. She then seemed to respond somewhat. A portable chest plate taken at this time revealed, that the only portions of the lungs that appeared to be aerated were the right middle and lower lobes. The left lung appeared to be completely atelectatic. At this time the question arose as to whether there was a mucous plug in the brochus.

Also, on x-ray, the heart appeared to be more markedly enlarged than could be accounted for by the fact that the x-ray was taken while the child was in the recumbent position. The enlarged heart, plus distended neck veins and a palpable liver, gave the staff the impression that the child might be in cardiac failure, and so 4 cc. of Cedilanid was given slowly intravenously.

In view of the x-ray findings of atelectasis, the ear, nose and throat staff was notified and a bronchoscopy was performed. A great deal of purulent and sanguinopurulent fluid was aspirated from each main bronchus. The patient became markedly cyanotic several times during the procedure, but the cyanosis was relieved by oxygen. A tracheotomy was performed, as it was thought that this would be the best way to keep the patient well suctioned. About 10 minutes after the tracheotomy, the patient turned markedly cyanotic, and the pulse could no longer be obtained. Neither cardiac nor respiratory stimulants helped. The patient's blood culture was reported as positive for meningococci.

Autopsy Findings by Dr. Dolgopol. The body was that of a well-developed girl of twelve. A few petechiae were still visible on the skin of the chest. The brain was very large and weighed 1460 grams. A purulent exudate was present over the hemispheres

and at the base of the brain, especially in the region of the chiasm. The convolutions were very wide and flat.

On opening the body the liver was found to be quite large, extending *2* finger breadths below the costal margin. It was yellowish in color, and friable. In view of the yellow color of the liver, a piece of liver tissue was sent to Dr. Alexander Gettler for examination for sulfonamides. His report was that only 1/10 of a milligram of sulfadiazine was found in *230* grams of liver, a very small amount. Several subepicardial petechiae were present over the left ventricle. The heart was dilated, but the myocardium was rather firm. The entire left lung was purplish in color, noncrepitant, rather small in size and the tissue sank in water. This looked like a massive atelectasis of the left lung. The greater part of the right upper and about half of the lower lobe of the right lung also were collapsed. Only the right middle lobe was partly air-holding and on sections was found to be edematous. Some pleural petechiae were present in the interlobar sulci of both lungs. No gross hemorrhages were seen in the adrenals.

Microscopic slides were projected. The heart showed early Zenker's degeneration and fragmentation of some fibers, but there was no interstitial mycocarditis. The valves were intact. Sections from the left lung showed not only collapse of the alveoli, but also the presence of polymorphonuclears and fibrin in the lumen of partly collapsed alveoli. Polymorphonuclears were also present in some of the small bronchi. In some sections edema fluid was present in some of the small bronchi and in the alveolar lumen. The collapsed parts of the right lung showed essentially a similar picture. In the liver there was a slight infiltration of the parenchymal cells with fat, but there was no hepatitis, no significant congestion. The spleen was congested and there were a few hemorrhages in the pulp. In the kidney a large amount of coagulated protein was present in some glomerulae and the tubular epithelium was quite cloudy. A few minute capillary hemorrhages were present in the cerebral cortex, but none were seen in the medulla. In the brain the subarachnoid space was filled with a polymorphonuclear exudate. A few perivascular cuffs were present in the floor of the fourth ventricle. Some loss of Nissl substance was noted in some of the cells in the reticular nucleus which is considered to be one of the centers of respiration. No hemorrhages or softening was found in that area, however.

PNEUMOCOCCIC MENINGITIS

Dr. Tucker presented Case No. 1856, a 6½-week-old white male infant, transferred from another hospital and admitted here on April 13, 1949. Past history was essentially noncontributory.

Present Illness began about ten days before admission, when the mother noted that the infant seemed "out of sorts." The family physician was summoned five days before admission, because of episodes of stiffening. There was no history of vomiting, but the infant continued to do poorly, and was admitted to the other hospital the day prior to admission here. A lumbar puncture there revealed turbid fluid with a positive Pandy test and thick coagulum. 20 W.B.C. were counted. Diplococci were seen on smear. The patient was given 250,000 units of crystalline penicillin and 1.0 gm. of sulfadiazine by rectum. He was transferred shortly thereafter to Willard Parker Hospital.

On Admission, physical examination revealed, temperature 101.2° F., respirations 38. The child appeared desperately ill, with a pale, waxen skin. The cry was weak. Activity was poor. There was no rash. Mucous membranes were pale and dry, but free of petechiae. Scalp veins were prominent; anterior fontanel was bulging. There were nystagmoid movements of the eyes, but no strabismus. Pupils were regular, round and equal. The fundi was not visualized. Respirations were rapid and shallow, without retraction. There were no adventitious sounds. The heart was not enlarged. Sinus tachycardia was noted. Abdomen was unremarkable. There were hydroceles bilaterally. The reflexes were equal and hyperactive. The extremities were rigid and resisted flexion. The Kernigs were questionable, Brudzinski negative, and the neck flexible.

Laboratory Examination. There was no urine obtained. Hemogram: Hemoglobin 8 gm.; W.B.C. 20,000, with 55 mature polymorphonuclear, and 30 band forms. Spinal fluid slightly bloody under increased pressure. Cells: 1,000 W.B.C., 90 per cent polys, after acetic acid. Sugar less than 10 mg. per cent. Protein 300 mg. per cent. Direct examination of fluid revealed pneumococci, type V. No growth was obtained on culture. Organisms sensitive to .0078 units penicillin per cc. Blood culture negative.

Hospital Course. The child received 250,000 units of crystalline

penicillin shortly after admission, and 0.5 gm. sulfadiazine by mouth. Lumbar puncture, at first unsuccessful, was performed five hours after admission. At the end of the procedure, the infant became limp, apneic and no heart sounds were audible. Oxygen, stimulants and artificial respiration were of no avail, and the infant was pronounced dead. The blood culture was taken immediately post-mortem from the heart.

Autopsy Findings by Dr. Dolgopol. The body was that of a well-developed infant. The left pupil was slightly wider than the right. A left hydrocele was present; the brain weighed 560 grams, the subarachnoid space contained a large amount of thick greenish pus over the entire surface of the brain and cerebellum, including the base. No exudate was found in the middle ears. The lungs showed several scattered areas of atelectasis, but the trachea and bronchi were not obstructed. The right lower lobe was greatly congested and airless and about one-third of the left lower lobe was consolidated. The liver was diffusely congested. The spleen was small and the pulp was not significantly hyperplastic. A yellowish white nodule, the size of a small bean, was present in the medulla and cortex of the right adrenal which was significantly larger than the left adrenal. Recent hemorrhages were present in the medullae of both adrenals.

Microscopic Sections Were Projected. The subarachnoid space on all sections from the brain was wide and was filled with an exudate consisting of polymorphonuclears and fibrin. The brain was very edematous and congested. Several small perivascular hemorrhages were present in the cortex and medulla. A polymorphonuclear exudate was present in the fourth ventricle. Sections from the heart showed indistinct striations and marked interstitial edema. The valves were intact. Sections from the lungs contained large groups of alveoli filled with blood, fibrin and macrophages. A great deal of edema fluid and many macrophages were present in the alveolar lumen in the upper lobes. Some blood was present in the bronchi of the lower lobes. The picture in the lungs is that of a beginning hypostatic pneumonia. Passive congestion and some degeneration of the parenchymal cells was present in the liver. Both adrenals showed hemorrhages into the medulla. In the right adrenal, in addition, there was a large area containing irregular clumps of calcific material and a number of phagocytes filled with

brown blood pigment. Some calcification was also present in the neighboring portions of the cortex. This picture apparently represents an old hemorrhage with subsequent calcification. The old hemorrhage probably occurred at birth. The bilateral recent hemorrhage was severe enough to be a cause of circulatory collapse.

CORPULENCE IN CHILDHOOD AND ADOLESCENCE. (Medical Journal of Australia, Sydney, 2:649, Nov. 29, 1947). Graham discusses constitutional patterns and etiologic factors and the system of treatment he has developed on the basis of a close study of 52 cases of corpulence in childhood and adolescence. He stresses that the cause is predominantly endogenous rather than exogenous. The treatment included oral thyroid medication in unusual large dosage, supported by psychotherapy, dietetic control, congenial physical activities, accurate measurements and periodic observation and supervision. By means of indexes of weight, height and size the efficacy of treatment has been assessed and demonstrated, and by the graphic plotting of statistical data the significance of the results obtained by thyroid therapy has been proved: It is no longer reasonable to blame the children or their parents for the obesity, nor is it justifiable to underfeed the patients or to deny them the benefits of thyroid medication in adequate dosage.—*Journal A.M.A.*

ADRENAL HEMORRHAGE IN MONOCYTIC LEUKEMIA. (Glasgow Medical Journal, 28:366, Nov. 1947). Lauckner and Hebbert report an abscess in the axilla and signs of anemia in a school girl, aged 11. The patient's condition was recognized as monocytic leukemia. The first transfusion of blood was followed by improvement, but in the course of the second transfusion circulatory failure quickly developed and the patient died. Necropsy revealed bilateral adrenal hemorrhage apparently precipitated by blood transfusion. The histologic features are described, and attention is drawn to the giant cells in the tissues. The nature of these cells is discussed. There is a paucity of reports of adrenal hemorrhage in leukemia, although this might be expected to occur not infrequently. Hemorrhagic reactions to blood transfusion are briefly reviewed.—*Journal A.M.A.*

BOOK REVIEW

ORTHOPSYCHIATRY, 1923-1948, Retrospect and Prospect. Edited by Lawson G. Lowrey, M.D. Cloth. Pp. 623. Price $8.50. American Orthopsychiatric Association, Inc., N. Y., 1948.

This is an interesting volume and can be read with profit by anyone who is particularly interested in the psychiatric problems of the young. The book traces the development of orthopsychiatry as a definite field with a purpose, and the history of the development of child guidance clinics is of particular interest. It is hard for those who were not involved in the early struggle to appreciate the changes that have taken place in a quarter of a century in the approach to the problems of the young. This reviewer was especially interested in Ben Karpman's excellent essay, "Milestones in the Advancement of Knowledge of the Psychopathology of Delinquency and Crime," Franz Alexander on "The Role of the Scientist in Society" and "The Psychiatrist" by Samuel W. Hartwell. In view of the tendency of our times to permit greater and greater government participation in medicine it might be worth-while to quote from Ben Karpmen's article what governments can do when they are in full control as in State Mental Institutions: "State hospitals are organized on the basis of administrative economy and feel they have attained their highest efficiency when the per capita cost of patient maintenance has been reduced by another per cent or two. Little or no provision is made for time, money or other opportunities for research. The great advances in psychiatry, such as psychoanalysis, the malarial treatment of von Jauregg, or Sakel's insulin treatment, were all done by extra-institutional men—and in Europe at that. "What advances have been made in American Institutions? Practically all the studies appearing in psychiatric journals are the results of individual efforts by isolated workers in various psychiatric institutions. They must overcome administrative resistance in order to do the work the way they want to do it. Done chiefly on their own time, ... But for the few institutional psychiatrists with strong research spirit who get a sense of personal satisfaction in tracing a particular problem, we should have gotten nowhere." MICHAEL A. BRESCIA, M.D.

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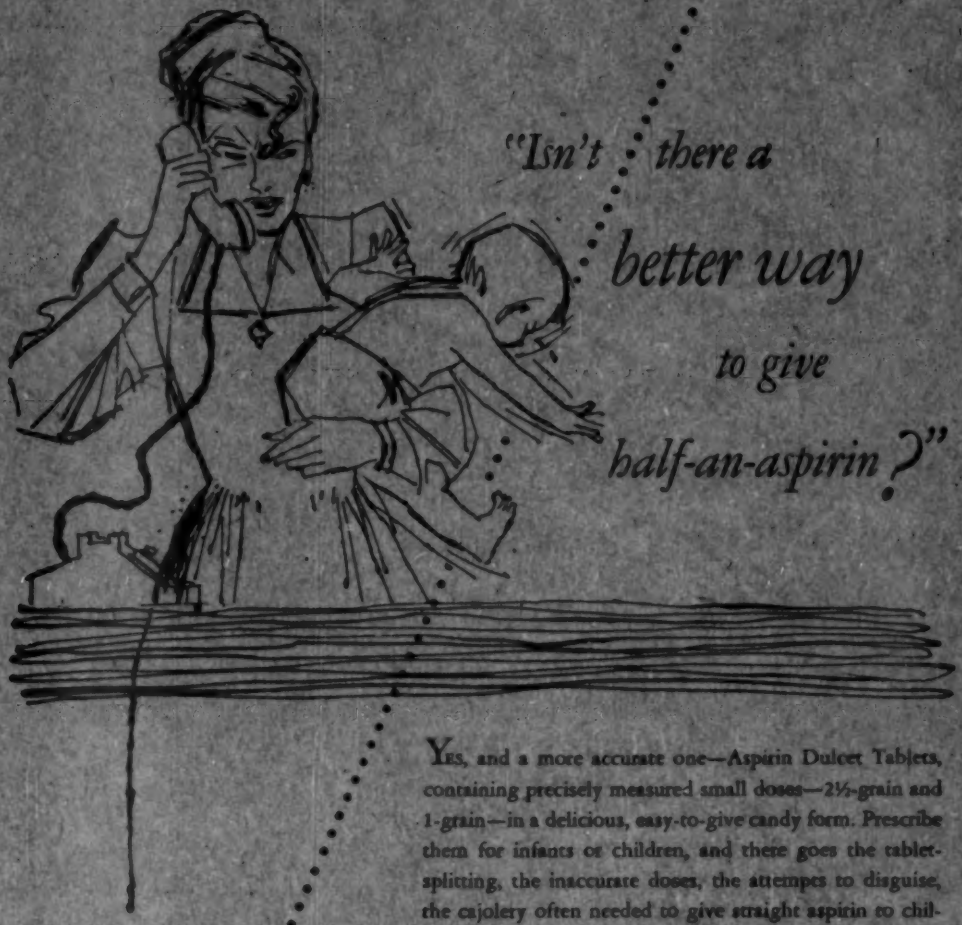
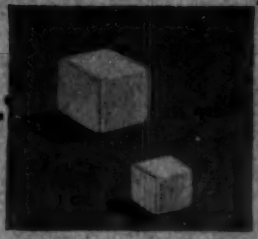


"Isn't there a better way to give half-an-aspirin?"

YES, and a more accurate one—Aspirin Dulcet Tablets, containing precisely measured small doses—2½-grain and 1-grain—in a delicious, easy-to-give candy form. Prescribe them for infants or children, and there goes the tablet-splitting, the inaccurate doses, the attempts to disguise, the cajolery often needed to give straight aspirin to children. While these tablets look and taste like after-dinner-mint candies, and have the full appeal of candy to the youngsters, there's no change in the therapeutic effect of the acetylsalicylic acid. The 2½-gr. Aspirin Dulcet Tablets are supplied in bottles of 80, the 1-gr. in bottles of 80 and 250. ABBOTT LABORATORIES, NORTH CHICAGO, ILLINOIS.



SPECIFY

aspirin DULCET® tablets

(Acetylsalicylic Acid, Abbott)

®(Medicated Sugar Tablets, Abbott)